



***I Dose Alarm (IDA-110)  
User's Manual.***

***Intech Dosimeters Pvt.Ltd.***

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## **I Dose Alarm (IDA-110)**

### **Personal Dosimeter User's Manual**

#### **1. Introduction**

The I dose alarm is a compact pen type X &  $\gamma$  dosimeter with dose & dose rate alarm built on 35 years of experience in radiation protection instrumentation. It is ideal for use in Nuclear Power Stations, University Laboratories, Cancer Hospitals and other industries dealing with radiation. It is suitable for use as a single stand-alone dosimeter or as part of a comprehensive Dose Management System using Intech DMS software package. Immunity to Electromagnetic Radiation from mobile phone in close proximity, very low power consumption with battery lasting for over 1 year, when used for 8 hours a day and simplicity of operation are the outstanding features of the dosimeter.

With "I dose" there is no need to juggle with scroll, increment / decrement buttons for setting alarm and other parameters. The dosimeter has an USB interface to connect to a PC for setting various parameters like the dosimeter or user's ID, Calibration Factor, dose / dose rate alarm settings and the time / date of issue. All these parameters are stored in a non-volatile EEPROM and can be retrieved even if the battery runs out. A free, user-friendly, PC software is provided to facilitate entry of these parameters as well as transfer and storage of dose meter readings in a database.

#### **2. Features:**

- **Semiconductor diode detector**
- Convenient PEN-type design
- **Large, easy-to-read LCD display**
- Light weight - 80 gms
- Simple 1-button operation
- **USB interface** for data setting / transfer using free Intech DMS software
- Storing the time / date of issue through PC

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- Storage of Half-hourly dose
- **Storage of last value before switch off**
- **Very low power design** - over 5000 hrs of continuous operation with CR2477 coin cell
- Loud (80dB), audible, Dose / dose rate alarms.
- Excellent immunity to Cell phone EMI
- **Switch - off option: Either through the button on the device or through PC**
- One-year replacement warranty

## 3. SPECIFICATIONS

### Radiological

Radiation detected	: X and $\gamma$ radiation
Display Units	: Direct readout of dose equivalent in Sv
Range Dose	: 1 $\mu$ Sv to 1 Sv auto-ranging
Dose rate	: 0.1 to 100mSv/h, auto-ranging
<b>Alarms</b>	: Dose and dose rate alarms continuously settable ; 80 dB (@ 30 cm) buzzer; 9dB optional; Dose: long intermittent ; dose rate: short intermittent; Over range: continuous
Energy response	: $\pm 25\%$ from 50keV to 1.25 MeV ( $^{137}\text{Cs}$ ) : <b>(BARC Tested)</b>
Angular response	: $\pm 15\%$ up to $\pm 60^\circ$ for $^{137}\text{Cs}$ <b>(BARC Tested)</b>
Accuracy	: $^{137}\text{Cs} \pm 10\%$ <b>(BARC Tested)</b>
Dose rate linearity	: $< \pm 20\%$ upto 1 Sv/h <b>(BARC Tested)</b>
<b>Overload</b> <b>(BARC Tested)</b>	: 10 times the range, on exceeding 1Sv, : display indicates 'ovr' for over range, Audible alarm becomes continuous.

### Memory

Memory Type	: EEPROM, 10 years retention
Dose profile history	: Fixed, 30 mts intervals
No. of records	: 24

### Electrical and Mechanical

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Power supply	: Single Li Coin CR2477
Battery Life	: Over 5000 Hrs of continuous operation (non-alarming)
Communications	: USB connector.
Display and function	: Control by a single button; 'On' / 'Off', dose/rate select, mute.
Size	: Pen type enclosure 26mm x 130mm x 15mm
Weight	: < 100 g including battery / clip
Case material	: high impact ABS

## **Environmental**

Operating temperature	: 0 °C to 45 °C
Humidity	: 20% to 90% RH, non-condensing
Vibration	: IEC 61526: 2g, 15min., 10-33Hz
Shock	: 1.5m drop on each surface on to concrete
EMI/EMC	: Exceeds IEC 61526 Less than 5% change in response due to EMI 100 V/m, cell phone in close proximity

## **4. OPERATION**

**Principle of operation:** The dosimeter is basically an integrating device for indicating the cumulative dose. The pulses from the detector are counted in a counter and the counter is read every 5 secs, multiplied by the calibration factor and displayed as 'Dose' in  $\mu\text{Sv}$  or  $\text{mSv}$ . The dose rate is calculated based on the counts accumulated every 5 secs and multiplying it by a suitable factor to obtain dose rate per hour. Therefore, the dose rate could have large spread due to poor statistics in low dose rates. It is advisable to set the alarm level for dose rate above  $0.5\text{mSv/h}$  to avoid nuisance sounding of dose rate alarm. As the dose rate is instantaneous ( just averaged over 5 secs ) dose rate display is for guidance only and the dose rate alarm is meant to fore-warn momentary increases in dose rate above the expected dose rate.

**Switching 'On and Off':** Press the button on the front panel for a sec and release. The instrument will switch on into the buzzer/display check mode by turning on all

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the segments of the LCD and the buzzer for two secs. **If the buzzer does not sound, or if any segment fails to turn on, the dosimeter should not be used and returned to the manufacturer for service.** The display then resets to '0000' in dose display mode. To switch off the instrument press the switch and hold it for 5 Secs; the unit will switch 'off'. To switch it on again, wait for 5 secs and press the switch for one sec as above.

**In a second version, while the switching 'on' will be as above by pressing the switch for a second, the switching 'off' cannot be done manually. The unit can be switched 'off' only by connecting the dosimeter to a PC and using the software supplied.**

**Dose & dose rate display selection:** The display is normally in dose display mode ( $\mu\text{Sv}$  or  $\text{mSv}$ ). To go into the dose rate display, the front panel button is briefly pressed & released. Within a few Secs, the display will change to dose rate ( $\text{mSv/h}$ ) briefly and revert back to dose mode.

**Alarm & Mute:** The dose and dose rate alarms are sounded as long and short beeps respectively. In the case of both dose and dose rate, the beeps continue even if the alarm condition disappears. The display indicates 'ALM'. The beeps can be muted by briefly pressing & releasing the front panel button. The 'ALM' indication continues even after muting the buzzer till the instrument is switched 'off' and then 'on'.

**Overload condition:** The dosimeter is 100 % overload compatible. i.e., the dosimeter will not show any under estimate when the dosimeter is exposed to an overload of up to 100% the maximum range (2 Sv). As soon as the range of 1Sv is exceeded, the display will indicate "ovr" (over range) with the audible alarm sounding continuously.

**Storage of parameters:** The following parameters can be entered through a PC ( MS Windows) using a free software provided with the instrument.

- \* The dosimeter or user's ID
- \* Calibration Factor
- \* Dose / dose rate alarm settings
- \* Time / date of issue

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The dosimeter ID can be up to 8 characters (alphabets, or numbers). The calibration factor setting is not available to the user; it is for factory setting only. The date & time of issue setting is used to store the dose values every half an hour in the internal non-volatile memory with time stamp.

Another exclusive feature of the dosimeter is the storage of the last accumulated value of dose just prior to switch off. Thus the value is not lost if the unit is accidentally switched off.

**5. USB Interface & Software:** A mini USB B connector is provided on the side near the battery compartment for connection to a PC (Windows XP / Windows 7 / Vista). The dosimeter has an intrinsic RS232C interface which is converted to USB using an RS232-USB bridge. To establish a connection, connect the dosimeter to PC using the USB cable provided and switched it 'on'. The instrument can be switched on even if the battery is run down as it will be powered by the USB. Start the Intech DMS software (Fig.1). The software automatically searches for the device and gets connected. Refer to the screen shot of the software window below. Click on the connect/Read button for reading the dosimeter. The current reading / last reading before switch off will be displayed in the summary window on the top right corner along with date and ID number. The dosimeter settings such as dose / dose rate alarm level, ID No., Calibration factor are read and displayed in the 'Settings' Window. In the result pane, the half hourly logged data are displayed and on the right side of the result pane, the same data are plotted as a dose-vs-time graph. The graph shows the difference between consecutive data as a bar at half hourly intervals and hence the bar represents the total dose accumulated in the respective interval.

This facility is very useful in investigating overexposure cases. Suppose there is a significant dose during an interval which is the lunch time, it can be safely interpreted that the dosimeter was left in a radiation area during that time inadvertently. If the dose recorded in all the intervals are same (within statistical variations), it can be readily interpreted as a case of deliberate exposure. If there is a negative bar, then it is a case of the instrument switched off prior to that interval. Figs 3-5 indicate the pattern for normal genuine exposure, deliberate exposure and a reset condition occurring in any interval. On clicking the 'save' button, the entire data, including the half hourly data, are saved in the database (MS Access).



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'Reset' button is used to reset half-hourly data in the dosimeter; 'delete' button is for deleting selected data in the summary window before saving to the database. The delete function is useful when the dosimeter is read twice or when some experimental data are present.

On clicking the 'Search' button a search window opens (Fig.2). Using the search window, one can search for all the readings corresponding to an ID Number during a given interval by giving the starting date and ending date. The data are displayed and the graph for any any selected data is displayed. By clicking on 'export summary data' or 'export detailed data' the summary data or the detailed graph data are exported to MS Excel for print out / dose report

The 'Read-Settings' button on the bottom is used to read the data from the dosimeter. The Employee ID, Calibration factor, Dose rate alarm and dose alarm are read and displayed in the respective windows. The data are modified and saved using the 'Save-Settings' button. On pressing this button the user is prompted for password and only on entering the user name and password, the values can be changed and saved. This facility is useful to prevent unauthorized persons from altering the settings. The user name and password can be changed by clicking on the 'Change Password' button.

It is necessary to click on 'Disconnect' button, or wait for the status window to turn red, before disconnecting the device. Failure to do so will result in software hanging or data corruption or both.

## **Installation of Intech DMS software:**

Please read the 'read me' file in the installation CD before installing the Software. It is necessary to install the driver for the RS232 - USB bridge before installing the Intech DMS software. The driver is included in the CD.

For any queries / servicing / requirement of spare batteries contact:

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**Fig.1 DMS software**

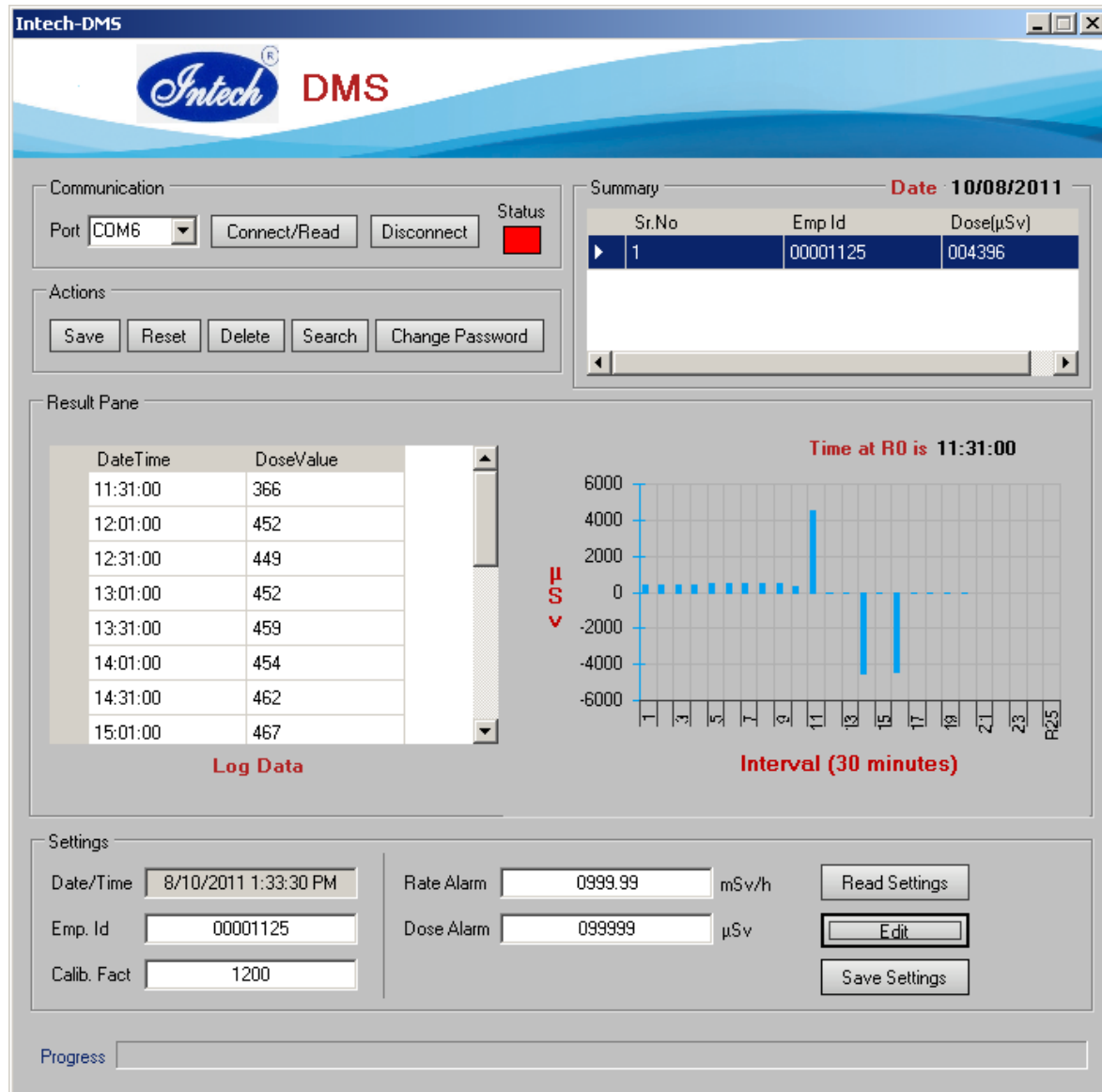


Fig.2 Search Window

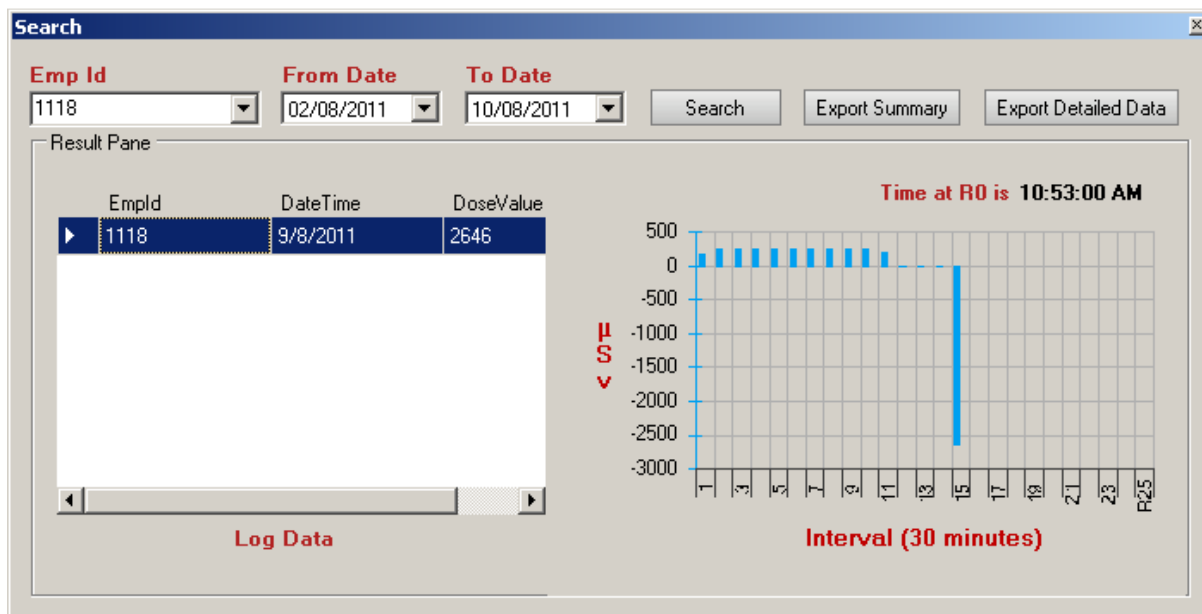


Fig.3 Genuine Exposure

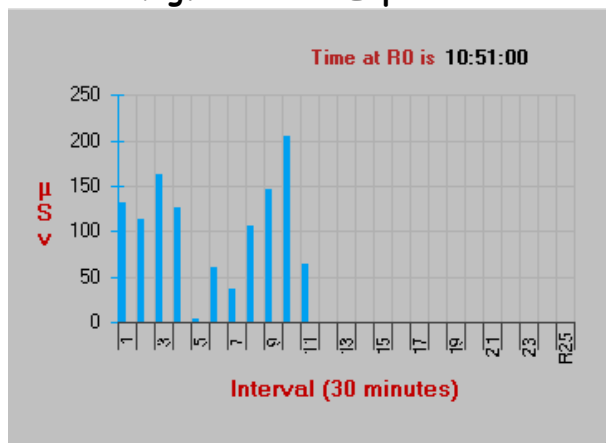


Fig. 3 shows a typical pattern for a genuine exposure. The exposures during all the intervals are different as will be the case in genuine personal exposure. Also notice that the exposure is almost zero during interval 5; this could be a lunch interval when the worker remains in a radiation-free area.

Fig.4 Deliberate Exposure

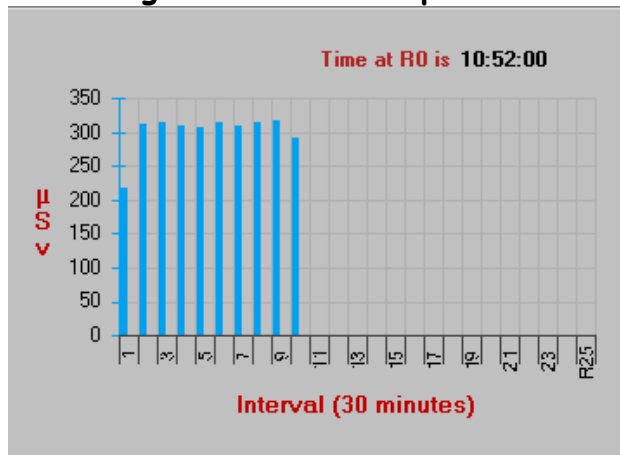


Fig.4 shows the pattern when a worker deliberately exposes the dosimeter to a radiation source. As in this case, the dosimeter is stationary, the dosimeter registers equal doses (within statistical variations) in the intervals. This insight will be very useful while reconciling the digital dosimeter readings with TLD doses.

**Fig.5 Dosimeter Reset during interval 13**

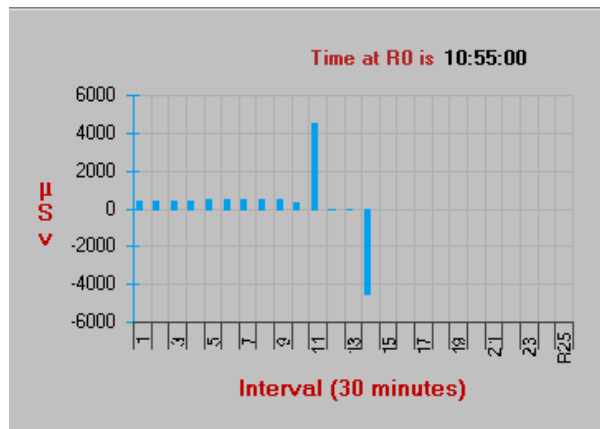


Fig.5 shows the pattern when a worker deliberately switches off the dosimeter to keep his radiation dose low. The graph is plotted after obtaining consecutive differences in cumulative readings to indicate the exposure in a given interval. As the dosimeter is integrating the dose, the counts in any interval will always be higher than or equal to the counts in the previous interval except when the reading is reset to zero deliberately by switching the unit 'off' and then 'on'.